

Challenges faced by undergraduate students learning immunology include vocabulary barrier, lack of exposure through secondary schools and the multi-disciplinary nature of this field. This project aimed at developing a series of micromodules that introduce foundational concepts of immunology to undergraduate students to help them break the enormous entry barrier required for learning and applying concepts in the specialized field of immunology. Basic concepts are delivered online to make way for more engaging and intellectual stimulating course content during face-to-face lecture time.

A total of five micromodules consisting of voice-over mini-lectures on immunological concepts have been produced. Two additional micromodules that introduce students to common laboratory techniques in life science research have also been developed. These micromodules altogether offered 114 minutes of online contact time for Year 3 and Year 4 undergraduate students in the School of Life Sciences at CUHK. The micromodules were uploaded to the Panopto video platform linked to the course website in the CU Blackboard eLearning system.

Topics covered in the micromodules represent part of a wider scope of knowledge normally delivered only during lecture periods in the past. Using a blended learning approach, students were asked to watch the micromodules before attending lectures. Supplementary follow-up questions were designed to accompany each micromodule to promote students' understanding and comprehension of the online content. In this way, more basic course content was moved online as out-of-class activity so that the instructor could utilize the extra face-to-face class time to focus on more intellectually engaging content and help students apply new knowledge in ways that advance their conceptual understanding.

Students' engagement was evaluated by gathering statistics from the Panopto video platform that tracks viewing activity of the micromodules. Analysis of the video metrics data indicates that 94% of students in the course watched the micromodules with a median view time of 131.6 minutes. We also observed a positive correlation between students' performance in the course (in terms of quiz and exam scores) and their total average time spent on the micromodules.

Students' feedback and perception on their learning experience were further collected by an evaluation survey on the micromodules at the end of course. Most students found the micromodules useful in learning a new topic in this course. They also appreciated the convenience, flexibility and the ability to self-pace their own studies. However, students also complained that watching videos significantly increased their workload outside of class and it was hard to stay attentive while watching the videos. Future efforts should be directed at devising new ways that motivate students to self-study and help them stay focused longer when using the micromodules. Efforts also need to be made to adjust students' expectations on entering a blended learning course to help them understand what the micromodules would mean to them and how they would need to adapt to the change.